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FIELD OF
THE
INVENTION...VISUAL INFORMATION SYSTEMS

The present invention relates to visual information systems.

BACKGROUND
OF THE
INVENTION

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Advertising is often presented in illuminated form consisting of an array of fluorescent lights. Such lights are usually switched on during the hours of darkness. The array occupies the same area as the image presented and consumes relatively large amounts of energy. Such systems are relatively inflexible in as much as the whole array needs to be rebuilt to display another image.

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Other arrays of moving images are known in which an array consisting of a plurality of rows and columns of ~~energizable~~ ^{energizable} light sources are individually ~~energizable~~ to produce, for example, a moving message. Such arrays have several times more columns of light source than rows. Also, the size of the array is the same size as the image and consequently the wiring of individual light sources to the controlling circuitry and the complexity of the control circuitry are likely to be very costly.

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It is an object of the invention to provide an improved visual information system.

SUMMARY
OF THE
INVENTION

According to the present invention there is provided a visual information system comprising an array consisting of a plurality of individually and selectively

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energizable

~~energizable~~ light sources arranged in rows and columns, a memory for storing a program representative of a predetermined image, a controller actuatable to control ^{energization} ~~energization~~ the selection and sequence of ~~energization~~ of the light sources within a predetermined time span in accordance with the predetermined program stored on the memory so that a viewer observing the array and being carried past the array at a predetermined speed will observe immediately following said predetermined time span the ~~said~~ predetermined image as an apparently stationary image occupying an area substantially larger than the area of

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said array.

According to the present invention there is further provided a visual information display system comprising a ~~[fibre]~~ ^{fiber} optic array in which one end of a bundle of optical ~~[fibres]~~ ^{fibers} is arranged so that the ends of the individual ~~[fibres]~~ ^{fibers} at one end of the bundle form a vertically elongate array of rows and columns and the ends of the individual ~~[fibres]~~ ^{fibers} at the opposite end of the bundle are connected to an ~~[electro-optical]~~ ^{electro-optical} interface unit, and means for supplying electrical signals to the interface unit to cause the array to display a succession of images in sufficiently quick succession that a viewer being carried past the array perceives a single horizontally elongate display consisting of said successive images located side by side.

Visual information system embodying the invention will now be described, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a front elevation of the system;
Figure 2 is a block diagram of the system;
Figure 3 is a more detailed block diagram of the system;

Figure 4 is a block diagram of another form of system embodying the invention; and

Figure 5 is an end view of a train passing through a tunnel and illustrating the positioning of the system.

The visual information system to be described is arranged to be located in tunnels through which public transportation vehicles such as tube trains normally run. The system consists of a series of light source arrays 2 arranged at spaced intervals along the track 4 on the side wall of the tunnel, generally level with the windows of the train so that the arrays can be viewed by the passengers in the train. A sensor 6 located upstream of

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each array 2 is responsive to the approach of the train to the array to actuate the array. Another sensor 8 located downstream of each array is responsive to when the train has passed to deactivate the array 2. The sensors 6 and 8
5 may take the form of infrared transmitter and receiver pairs.

Each array 2 consists of four columns and sixty four rows of individually and selectively ~~[energizable]~~ *energizable* light sources for example light emitting diodes.

10 Selected light sources in the array are switched ON and OFF by a controller 10 in accordance with a predetermined program stored in a memory 12. The controller is triggered by the sensor 6 and the program is cyclically repeated until a signal is received from the
15 sensor 8.

The switching rate of *energization* the light sources and the duration of their ~~[energization]~~ is such that a passenger sitting in the train and keeping his eyes directed at the array will observe an image several times wider than the
20 width of the array.

The effect is achieved because with light flashes of very short duration, the reaction of the human eye to the flash persists long after the flash has finished. Thus, where a series of very short flashes
25 occur over a short time span less than 0.015 seconds, all the flashes appear to the eye to have occurred at the same time and when the flashes are spaced from one another on the retina because the viewer has moved relative to the array, the eye perceives a composite light pattern which
30 will persist for a short while immediately following the time span. It will thus be appreciated that a program can be created and stored in the memory 12 which will produce almost any desired image for the observer. The image may take the form of alpha numeric information or ~~[may]~~ *may* take the
35 form of an advertising poster.

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The block diagram of the system is more clearly shown in Figure 3.

As can be seen, the array 2 consists of a series of light emitting diodes 20. In this arrangement only sixteen are shown, arranged in a single column. Each LED has a power output of 32 mcd's and has a high switching speed with a switching time faster than 10 nanoseconds.

The controller 10 includes a driver 22 which acts to drive the LED's 20 through respective resistors 24. The driver 22 is controlled by a central processing unit (CPU) 26 which derives its instructions from terminal 1 of the memory 12 via resistors R36 and R34 which feed terminal 5 of the CPU. The memory 12 is in the form of an erasable programmable read only memory (EPROM).

The CPU 26 is triggered into action by a signal received on terminal 28 from the sensor 6.

The CPU cyclically repeats the program stored in the EPROM 12 at a repetition rate in the range of from 10-50 Hz but is preferably 15 Hz.

By updating the memory periodically the passengers will be able to observe different images.

When a large plurality of arrays are provided they can be divided into groups with the memory of the system in each group being updatable simultaneously. A central computer (not shown) is provided to store a plurality of different programs. The central computer is connected to each group to update the memory in each group with a new program depending either upon the time of day or the location of the group.

Color When a ~~Colours~~ image is required, each light source of the array can be replaced by a row consisting of red, green and blue elements or a row consisting of red, green, blue and white light elements. Each element is selectively ~~energizable~~. It will be appreciated that by having the program determine the period of ~~energization~~

energizable

energization

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of each light source, the shade of ^{color} [Colour] in the final image can be varied as required.

While the rows and columns in each memory can be varied, it is preferable that the ratio of rows to columns in the array is 16:1 or greater.

In the embodiment shown in Figure 4, the optical array 20 consists of an array formed by the exposed ends of a bundle 22 of optical ^{fibers} [fibres]. The opposite ends of the ^{electro-optical} [electro-optical] [fibres] of the bundle 22 are connected to an electro-optical interface unit 24. Data

representative of a desired image to be displayed is transmitted from a central computer 32 by radio optical or direct wire link to a data interface unit 30 which passes the signals to a processor 28 which in turn causes the signals to be stored in a storage unit 26. The processor 28 is responsive to a local trigger such as the sensors 6 and 8 described in connection with Figures 1 and 2 or a remote trigger, to cause the ^{electro-optical} [electro-optical] interface to read out the stored data from the memory 26 and to cause the corresponding image to be progressively reproduced on the display 20 in a manner such as that described in conjunction with Figures 1 to 3.

The central computer 32 can be programmed to send different displays to different groups of optical arrays as required and alter the displays stored by the memories 26 at different times of the day, week and/or month.

In the embodiment ^{shown} [shown] in Figure 5, a train 36 within a tunnel 34 carries an on-board transmitter 38 which is connected to an on-board or a remote central computer 32. Data from the computer 32 is transmitted by the transmitter 38 to a receiver 40 adjacent a display 20 mounted on the wall of the tunnel. The receiver is connected to the data interface 30 (see Figure 4) of the display from whereon the system operates in the same

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manner as described in connection with Figure 4.

The transmitter and receiver may be acoustic, optical or radio. Also, the train may have an on-board speed monitor and data representative of the speed of the train transmitted to the processor 28 so that the processor can modify the rate that the electro-optical interface reads signals from the memory 26 in a manner to
3 Synchronize the display with the speed of the train.

In a modification, instead of the interface 24
10 reading signals from the memory 26, the memory 26 can be omitted and the signals read in real time from the processor 28.